

What Is Claimed Is:

1. A prosthesis for the replacement of at least
a portion of the bone of a facet located on a
5 mammalian vertebra, comprising:

an articulating surface that articulates with
another facet;

a bone contacting surface that contacts a surface
of the vertebra, said articulating surface being
10 connected to said bone contacting surface; and

a fixation element that attaches said bone
contacting surface to the vertebra, said fixation
element being adapted for implantation into an
interior bone space of a pedicle of the vertebra;

15 wherein said prosthesis is configured so that no
portion of said prosthesis contacts the posterior arch
of said vertebra.

2. A prosthesis according to claim 1 wherein
20 the surface of said vertebra contacted by said bone

contacting surface comprises an exterior surface of the vertebra.

3. A prosthesis according to claim 1 wherein
5 the surface of the vertebra contacted by said bone contacting surface comprises a resected surface of said vertebra.

4. A prosthesis according to claim 1 wherein
10 said fixation element comprises a post, said bone contacting surface defines an opening therein, and further wherein said post attaches said bone contacting surface to the vertebra by extending
15 through said opening.

5. A prosthesis according to claim 4 wherein
said fixation element comprises an enlarged head
attached to said post for capturing said bone
contacting surface against the surface of the
20 vertebra.

6. A prosthesis according to claim 5 wherein said enlarged head is permanently attached to said post.

5 7. A prosthesis according to claim 5 wherein said enlarged head is selectively attachable to said post.

10 8. A prosthesis according to claim 7 wherein said post is threaded at its outer end, and further wherein said enlarged head comprises a nut adapted to be selectively screwed onto said threaded post.

15 9. A prosthesis according to claim 4 wherein said post comprises a non-circular recess on its outer end for turning said post into the vertebra.

20 10. A prosthesis according to claim 9 wherein said non-circular recess comprises a hexagonal cross-section.

11. A prosthesis according to claim 4 wherein
said post is cannulated to facilitate delivery to the
vertebra over a guidewire.

5 12. A prosthesis according to claim 4 wherein
said post is threaded on its inner end to facilitate
attachment to the vertebra.

10 13. A prosthesis according to claim 4 wherein
said post is ribbed on its inner end to facilitate
attachment to the vertebra.

15 14. A prosthesis according to claim 13 wherein
said ribbing extends parallel to the longitudinal axis
of said post.

20 15. A prosthesis according to claim 13 wherein
said ribbing extends transverse to the longitudinal
axis of said post.

16. A prosthesis according to claim 4 wherein said post is barbed on its inner end to facilitate attachment to the vertebra.

5 17. A prosthesis according to claim 4 wherein said post has a circular cross-section along at least a portion of its length.

10 18. A prosthesis according to claim 4 wherein said post has a non-circular cross-section along at least a portion of its length.

15 19. A prosthesis according to claim 18 wherein said post has an oval cross-section along at least a portion of its length.

20 20. A prosthesis according to claim 18 wherein said post has a polygonal cross-section along at least a portion of its length.

21. A prosthesis according to claim 20 wherein
said post has a rectangular cross-section along at
least a portion of its length.

5 22. A prosthesis according to claim 20 wherein
said post has a triangular cross-section along at
least a portion of its length.

10 23. A prosthesis according to claim 4 wherein
said post has an expandable cross-section along at
least a portion of its length.

15 24. A prosthesis according to claim 23 wherein
said post comprises an inner member and an outer
member, said inner member is slidably received within
said outer member, and further wherein said outer
member expands relative to said member according to
the longitudinal position of said inner member
relative to said outer member.

20

25. A prosthesis according to claim 24 wherein
said outer member comprises a plurality of talons
which are cammed outward by said inner member
depending on the longitudinal position of said inner
5 member relative to said outer member.

26. A prosthesis according to claim 4 wherein
said prosthesis further comprises a supplemental
holding element for holding said fixation element to
10 said vertebra.

27. A prosthesis according to claim 26 wherein
said supplemental holding element comprises a
transverse pin, and further wherein said post
15 comprises a transverse hole for receiving said
transverse pin.

28. A prosthesis according to claim 26 wherein
said supplemental holding element comprises a spiked
20 washer, said fixation element comprises an enlarged
head for capturing said bone contacting surface

against the surface of the vertebra, and further wherein said spiked washer is captured to said vertebra by said enlarged head.

5 29. A prosthesis according to claim 26 wherein said supplemental holding element comprises a filament extending through a filament opening formed in said fixation element.

10 30. A prosthesis according to claim 29 wherein said filament opening is formed in said post.

 31. A prosthesis according to claim 29 wherein said fixation element comprises an enlarged head for
15 capturing said bone contacting surface against the surface of the vertebra, and further wherein said filament opening is formed in said enlarged head.

 32. A prosthesis according to claim 1 wherein
20 said prosthesis comprises a superior facet prosthesis.

33. A prosthesis according to claim 32 wherein
said articulating surface comprises a blade.

5 34. A prosthesis according to claim 4 wherein
said articulating surface comprises a blade, and
further wherein said blade is laterally offset from
said opening.

10 35. A prosthesis according to claim 1 wherein
said prosthesis comprises an inferior facet
prosthesis.

36. A prosthesis according to claim 35 wherein
said articulating surface comprises a talon.

15 37. A prosthesis according to claim 4 wherein
said articulating surface comprises a talon, and
further wherein at least a portion of said talon is
laterally offset from said opening.

20

38. A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising:

an articulating surface that articulates with another facet;

a bone contacting surface that contacts a surface of the vertebra, said articulating surface being connected to said bone contacting surface; and

a fixation element that attaches said bone contacting surface to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

wherein said bone contacting surface is configured to engage a resected surface of the vertebra.

39. A prosthesis according to claim 38 wherein the resected surface of the vertebra is recessed relative to the surrounding portions of the vertebra, and further wherein said bone contacting surface is configured to engage the recessed surface.

40. A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising:

5 an articulating surface that articulates with another facet;

 a bone contacting surface that contacts a surface of the vertebra, said articulating surface being connected to said bone contacting surface; and

10 a fixation element that attaches said bone contacting surface to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

 wherein said bone contacting surface has a
15 smaller surface area than said articulating surface.

41. A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising:

20 an articulating surface that articulates with another facet;

a bone contacting surface that contacts a surface of the vertebra, said articulating surface being connected to said bone contacting surface; and

a fixation element that attaches said bone contacting surface to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

wherein said articulating surface comprises a wing ear extending upward from said bone contacting surface.

42. A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising:

an articulating surface that articulates with another facet;

a bone contacting surface that contacts a surface of the vertebra, said articulating surface being connected to said bone contacting surface; and

a fixation element that attaches said bone contacting surface to the vertebra, said fixation

element being adapted for implantation into an
interior bone space of a pedicle of the vertebra;

wherein said articulating surface is
substantially planar and extends adjacent to the
5 pedicle.

43. A prosthesis for the replacement of at least
a portion of the bone of a facet located on a
mammalian vertebra, comprising:

10 an articulating surface that articulates with
another facet;

a bone contacting surface that contacts a surface
of the vertebra, said articulating surface being
connected to said bone contacting surface; and

15 a fixation element that attaches said bone
contacting surface to the vertebra, said fixation
element being adapted for implantation into an
interior bone space of a pedicle of the vertebra;

wherein said articulating surface is
20 substantially planar and extends substantially
parallel to said fixation element.

44. A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising:

5 an articulating surface that articulates with another facet;

 a bone contacting surface that contacts a surface of the vertebra, said articulating surface being connected to said bone contacting surface; and

10 a fixation element that attaches said bone contacting surface to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

 wherein said fixation element clamps said bone
15 contacting surface to a resected surface of the vertebra.

45. A prosthesis for the replacement of at least a portion of the bone of a facet located on a
20 mammalian vertebra, comprising:

an articulating element that articulates with
another facet;

a bone contacting element that contacts a surface
of the vertebra, said articulating element being
5 connected to said bone contacting element; and

a fixation element that attaches said bone
contacting element to the vertebra, said fixation
element being adapted for implantation into an
interior bone space of a pedicle of the vertebra;

10 wherein said prosthesis is configured so that no
portion of said prosthesis contacts the posterior arch
of said vertebra.

46. A prosthesis for the replacement of at least
15 a portion of the bone of a superior facet located on a
mammalian vertebra and for replacement of at least a
portion of the bone of an inferior facet located on
the same mammalian vertebra, comprising:

a superior articulating element that articulates
20 with another facet;

a superior bone contacting element that contacts one of a surface of the vertebra or another element contacting a surface of the vertebra, said superior articulating element being connected to said superior bone contacting element; and

an inferior articulating element that articulates with another facet;

an inferior bone contacting element that contacts one of a surface of the vertebra or another element contacting a surface of the vertebra, said inferior articulating element being connected to said inferior bone contacting element; and

a fixation element that attaches said superior bone contacting element and said inferior bone contacting element to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

wherein said prosthesis is configured so that no portion of said prosthesis contacts the posterior arch of said vertebra.

47. A prosthesis for the replacement of at least
a portion of the bone of a superior facet located on a
first mammalian vertebra and for replacement of at
least a portion of the bone of an inferior facet
5 located on a second mammalian vertebra, comprising:

a superior articulating element that articulates
with another facet;

a superior bone contacting element that contacts
one of a surface of the first vertebra or another
10 element contacting a surface of the vertebra, said
superior articulating element being connected to said
superior bone contacting element;

a first fixation element that attaches said
superior bone contacting element to the first
15 vertebra, said first fixation element being adapted
for implantation into an interior bone space of a
pedicle of the vertebra; and

an inferior articulating element that articulates
with another facet;

20 an inferior bone contacting element that contacts
one of a surface of the second vertebra or another

element contacting a surface of the vertebra, said
inferior articulating element being connected to said
inferior bone contacting element; and

5 a second fixation element that attaches said
inferior bone contacting element to the second
vertebra, said second fixation element being adapted
for implantation into an interior bone space of a
pedicle of the vertebra; and

10 wherein said prosthesis is configured so that no
portion of said prosthesis contacts the posterior
arches of said first and second vertebrae.

48. A method for replacing at least a portion of
the bone of a facet located on a mammalian vertebra,
15 comprising:

providing:

an articulating surface that articulates
with another facet;

20 a bone contacting surface that contacts a
surface of the vertebra, said articulating surface
being connected to said bone contacting surface; and

a fixation element that attaches said bone contacting surface to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

5 wherein said prosthesis is configured so that no portion of said prosthesis contacts the posterior arch of said vertebra; and

 positioning said bone contacting surface against a surface of the vertebra; and

10 attaching said bone contacting surface to the vertebra using said fixation element.

 49. A method according to claim 48 wherein the surface of said vertebra contacted by said bone contacting surface comprises an exterior surface of the vertebra.

15

 50. A method according to claim 48 wherein the surface of the vertebra contacted by said bone contacting surface comprises a resected surface of said vertebra.

20

51. A method according to claim 48 wherein said
fixation element comprises a post, said bone
contacting surface defines an opening therein, and
5 further wherein said post attaches said bone
contacting surface to the vertebra by extending
through said opening.

52. A method according to claim 51 wherein said
10 fixation element comprises an enlarged head attached
to said post for capturing said bone contacting
surface against the surface of the vertebra.

53. A method according to claim 52 wherein said
15 enlarged head is permanently attached to said post.

54. A method according to claim 52 wherein said
enlarged head is selectively attachable to said post.

20 55. A method according to claim 54 wherein said
post is threaded at its outer end, and further wherein

said enlarged head comprises a nut adapted to be selectively screwed onto said threaded post.

5 56. A method according to claim 51 wherein said post comprises a non-circular recess on its outer end for turning said post into the vertebra.

10 57. A method according to claim 56 wherein said non-circular recess comprises a hexagonal cross-section.

15 58. A method according to claim 51 wherein said post is cannulated to facilitate delivery to the vertebra over a guidewire.

59. A method according to claim 51 wherein said post is threaded on its inner end to facilitate attachment to the vertebra.

60. A method according to claim 51 wherein said post is ribbed on its inner end to facilitate attachment to the vertebra.

5 61. A method according to claim 60 wherein said ribbing extends parallel to the longitudinal axis of said post.

10 62. A method according to claim 60 wherein said ribbing extends transverse to the longitudinal axis of said post.

15 63. A method according to claim 51 wherein said post is barbed on its inner end to facilitate attachment to the vertebra.

20 64. A method according to claim 51 wherein said post has a circular cross-section along at least a portion of its length.

65. A method according to claim 51 wherein said post has a non-circular cross-section along at least a portion of its length.

5 66. A method according to claim 65 wherein said post has an oval cross-section along at least a portion of its length.

10 67. A method according to claim 65 wherein said post has a polygonal cross-section along at least a portion of its length.

15 68. A method according to claim 67 wherein said post has a rectangular cross-section along at least a portion of its length.

20 69. A method according to claim 67 wherein said post has a triangular cross-section along at least a portion of its length.

70. A method according to claim 51 wherein said post has an expandable cross-section along at least a portion of its length.

5 71. A method according to claim 70 wherein said post comprises an inner member and an outer member, said inner member is slidably received within said outer member, and further wherein said outer member expands relative to said inner member according to the
10 longitudinal position of said inner member relative to said outer member.

 72. A method according to claim 71 wherein said outer member comprises a plurality of talons which are
15 cammed outward by said inner member depending on the longitudinal position of said inner member relative to said outer member.

 73. A method according to claim 51 wherein said
20 prosthesis further comprises a supplemental holding

element for holding said fixation element to said
vertebra.

5 74. A method according to claim 73 wherein said
supplemental holding element comprises a transverse
pin, and further wherein said post comprises a
transverse hole for receiving said transverse pin.

10 75. A method according to claim 73 wherein said
supplemental holding element comprises a spiked
washer, said fixation element comprises an enlarged
head for capturing said bone contacting surface
against the surface of the vertebra, and further
wherein said spiked washer is captured to said
15 vertebra by said enlarged head.

20 76. A method according to claim 73 wherein said
supplemental holding element comprises a filament
extending through a filament opening formed in said
fixation element.

77. A method according to claim 76 wherein said filament opening is formed in said post.

5 78. A method according to claim 76 wherein said fixation element comprises an enlarged head for capturing said bone contacting surface against the surface of the vertebra, and further wherein said filament opening is formed in said enlarged head.

10 79. A method according to claim 48 wherein said prosthesis comprises a superior facet prosthesis.

80. A method according to claim 79 wherein said articulating surface comprises a blade.

15 81. A method according to claim 51 wherein said articulating surface comprises a blade, and further wherein said blade is laterally offset from said opening.

20

82. A method according to claim 51 wherein said prosthesis comprises an inferior facet prosthesis.

83. A method according to claim 82 wherein said articulating surface comprises a finger.

84. A method according to claim 51 wherein said articulating surface comprises a finger, and further wherein at least a portion of said finger is laterally offset from said opening.

85. A prosthesis for the replacement of at least a portion of the bone of a facet located on a mammalian vertebra, comprising:

an articulating element that articulates with another facet;

a bone contacting element that contacts a surface of the vertebra or another element contacting a surface of the vertebra, said articulating element being connected to said bone contacting element; and

a fixation element that attaches said bone contacting element to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

5 wherein said prosthesis is configured so that no portion of said prosthesis contacts the posterior arch of said vertebra.

86. A prosthesis according to claim 85 wherein
10 said prosthesis comprises a superior facet prosthesis.

87. A prosthesis according to claim 86 wherein
 said bone contacting element is adapted to contact a resected surface of a pedicle or another element
15 contacting a resected surface of a pedicle.

88. A prosthesis according to claim 85 wherein
 said articulating element comprises a blade.

89. A prosthesis according to claim 85 wherein said prosthesis comprises an inferior facet prosthesis.

5 90. A prosthesis according to claim 89 wherein said bone contacting element is adapted to contact a resected surface of a pedicle or another element contacting a resected surface of a pedicle.

10 91. A prosthesis according to claim 89 wherein said articulating element comprises a finger.

15 92. A prosthesis according to claim 91 wherein said articulating element is configured to engage a resected surface of an inferior facet.

 93. A prosthesis according to claim 89 wherein at least a portion of said finger is laterally offset from said bone contacting element.

20

94. A method for replacing at least a portion of the bone of a facet located on a mammalian vertebra, comprising:

an articulating element that articulates with
5 another facet;

a bone contacting element that contacts a surface of the vertebra or another element contacting a surface of the vertebra, said articulating element being connected to said bone contacting element; and

10 a fixation element that attaches said bone contacting element to the vertebra, said fixation element being adapted for implantation into an interior bone space of a pedicle of the vertebra;

wherein said prosthesis is configured so that no
15 portion of said prosthesis contacts the posterior arch of said vertebra;

positioning said bone contacting surface against a surface of the vertebra or another element contacting a surface of the vertebra; and

20 attaching said bone contacting surface to the vertebra using said fixation element.

95. A method according to claim 85 wherein said prosthesis comprises a superior facet prosthesis.

5 96. A method according to claim 95 wherein said bone contacting element is adapted to contact a resected surface of a pedicle or another element contacting a resected surface of a pedicle.

10 97. A method according to claim 94 wherein said articulating element comprises a blade.

98. A method according to claim 94 wherein said prosthesis comprises an inferior facet prosthesis.

15 99. A method according to claim 98 wherein said bone contacting element is adapted to contact a resected surface of a pedicle or another element contacting a resected surface of a pedicle.

20

100. A method according to claim 98 wherein said articulating element comprises a finger.

5 101. A method according to claim 100 wherein said articulating element is configured to engage a resected surface of an inferior facet.

10 102. A method according to claim 98 wherein at least a portion of said finger is laterally offset from said bone contacting element.